

Collaborative infrastructure

Tommaso Vinci

SMILEI training workshop
November 6-7, 2017
Maison de la Simulation

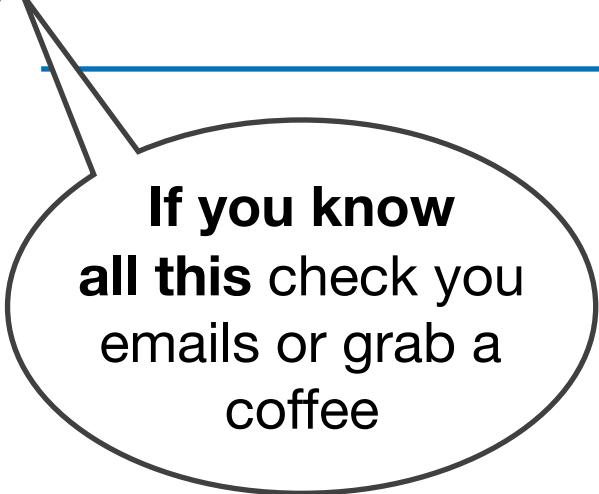


collaborative tools

conflicts	:	Git
build	:	Makefile
documentation	:	Sphinx/Travis
validation	:	Gitlab-CI



collaborative tools



If you know
all this check your
emails or grab a
coffee

conflicts	:	Git
build	:	Makefile
documentation	:	Sphinx/Travis
validation	:	Gitlab-CI



some numbers

17 developers

Julien Derouillat	1058
Fred Perez	878
Tommaso Vinci	655
Arnaud Beck	635
Mickael Grech	278
Mathieu Lobet	275
Marco Chiaramello	72
Marie Fle	45
Haithem Kallala	30
Charles Ruyer	20
Mohamed Gaalich	10
Andrea Sgattoni	7
Jeremie Gaidamour	6
Anna Grassi	9
Jérémie Dargent	4
Nicolas Aunai	4
Anton Golovanov	2
Total commits	3988



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50k lines

Language	files	comment	code
C++	108	5973	22192
Python	144	2498	13809
C/C++ Header	131	2872	9639
make	2	58	319
Bourne Shell	6	115	261
CSS	1	34	229
DOS Batch	1	2	227
HTML	5	49	160
YAML	2	10	60
Markdown	1	0	5
	401	11611	46901



version control system: Git



Graph



Description	Author	Date
Changed ghost cell blocking field boundary	grech <mickael.gre...	Jul 12, 2013, 4:10 PM
Introduced magnetic field exchange in the Max...	grech <mickael.gre...	Jul 12, 2013, 3:18 PM
Corrected boundary on solve_MaxwellFaraday...	grech <mickael.gre...	Jul 11, 2013, 2:27 PM
Merge remote-tracking branch 'origin'	grech <mickael.gre...	Jul 9, 2013, 2:55 PM
Replace communications by non blocking com...	jderouil <julien.dero...	Jul 2, 2013, 12:18 PM
Minor changes only.	grech <mickael.gre...	Jul 8, 2013, 1:53 PM
Added SmileiO classes (SmileiO manages Spe...	jderouil <julien.dero...	Jul 18, 2013, 5:01 PM
Replace communications by non blocking com...	jderouil <julien.dero...	Jul 2, 2013, 12:19 PM
Merge	jderouil <julien.dero...	Jun 27, 2013, 2:47 PM
		Jun 26, 2013, 5:34 PM
		Jun 18, 2013, 4:04 PM
		Jun 18, 2013, 3:08 PM
		Jun 27, 2013, 2:23 PM
		Jun 19, 2013, 10:15 AM
		Jun 18, 2013, 12:23 PM
		Jun 18, 2013, 9:33 AM
		Jun 17, 2013, 5:23 PM
		Jun 12, 2013, 11:29 AM
		Jun 6, 2013, 11:47 AM
		May 27, 2013, 12:27 PM
		May 24, 2013, 9:47 AM
		May 21, 2013, 3:31 PM
		May 21, 2013, 3:30 PM
		May 21, 2013, 10:24 AM
		May 16, 2013, 4:35 PM
		May 14, 2013, 3:27 PM
		May 14, 2013, 2:10 PM
		May 3, 2013, 9:51 AM
		May 21, 2013, 3:22 PM
		May 13, 2013, 7:11 PM
		May 13, 2013, 7:10 PM
		May 2, 2013, 11:05 PM
		Mar 29, 2013, 11:34 AM
		Julien Derouillat <jd... Mar 29, 2013, 9:38 AM

First SMILEI release



Commit: **1ab62eb24c642eeb7b417ee37f46e41e7bbb2baa [1ab62eb]**

Parents: Julien Derouillat

Author: 29 March 2013 at 09:38:38 GMT+1

Date:

Labels: tag: v1.0rc

Merge remote-tracking branch 'origin/master'
grech <mickael.gre... May 21, 2013, 3:30 PM
Corrected bug in writeField
Julien Derouillat <jd... May 21, 2013, 10:24 AM
Correct some parallelisation bug
Julien Derouillat <jd... May 16, 2013, 4:35 PM
MPI Integrated
Julien Derouillat <jd... May 14, 2013, 3:27 PM
MPI Integrated
Julien Derouillat <jd... May 14, 2013, 2:10 PM
Normalisation of ElectroMagn
Julien Derouillat <jd... May 3, 2013, 9:51 AM
Fixed bug in the projector and additional comm...
grech <mickael.gre... May 21, 2013, 3:22 PM
Idem.
grech <mickael.gre... May 13, 2013, 7:11 PM
Corrected Esirkepov projector. Modified dump f...
grech <mickael.gre... May 13, 2013, 7:10 PM
Here is a new version with more comments and...
grech <mickael.gre... May 2, 2013, 11:05 PM
renamed spice int smilei
tommaso <tommas... Mar 29, 2013, 11:34 AM
Julien Derouillat <jd... Mar 29, 2013, 9:38 AM

v1.0rc First SMILEI release



version control system: Git



Graph



Description	Author	Date
Changed ghost cell electric field boundary (WIP)	grech <mickael.gre...	Jul 12, 2013, 4:10 PM
Introduced magnetic field exchange in the Max...	grech <mickael.gre...	Jul 12, 2013, 3:18 PM
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Replace communications by non blocking com...	jderouil <julien.dero...	Jul 2, 2013, 12:19 PM
Merge	jderouil <julien.dero...	Jun 27, 2013, 2:47 PM
2D version of the code is implemented, it compi...	grech <mickael.gre...	Jun 26, 2013, 5:34 PM
added bibtex to doc: edit the file in doc/smilei.bib	tommaso <tommas...	Jun 18, 2013, 4:04 PM
changed utf8 char that prevented documentatio...	tommaso <tommas...	Jun 18, 2013, 3:08 PM
Introduced v0 of 2D HDF5 storage in SmileiMPI_...	jderouil <julien.dero...	Jun 27, 2013, 2:23 PM
Cartesian 2D solver integrated (sequential only)	jderouil <julien.dero...	Jun 19, 2013, 10:15 AM
Modified to not manage directly communication...	jderouil <julien.dero...	Jun 18, 2013, 12:23 PM
Introduced generic Cartesian XD exchangeParti...	jderouil <julien.dero...	Jun 18, 2013, 9:33 AM
Introduced automatic splitting for 2D domain de...	jderouil <julien.dero...	Jun 17, 2013, 5:23 PM
Modified Field constructors (add constructor sp...	jderouil <julien.dero...	Jun 12, 2013, 11:29 AM
Maxwell solved on the whole local subdomain	jderouil <julien.dero...	Jun 6, 2013, 11:47 AM
Test ECLIPSE environment	jderouil <julien.dero...	May 27, 2013, 12:27 PM
Correct bug in exchangeField	Julien Derouillat <jd...	May 24, 2013, 9:47 AM
Merge between MG & JD versions	grech <mickael.gre...	May 21, 2013, 3:31 PM
Merge remote-tracking branch 'origin/master'	grech <mickael.gre...	May 21, 2013, 3:30 PM
Corrected bug in writeField	Julien Derouillat <jd...	May 21, 2013, 10:24 AM
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two repositories

<https://github.com/SmileiPIC/Smilei>



Public

online documentation
public issues



two repositories

<https://github.com/SmileiPIC/Smilei>

<https://llrgit.in2p3.fr/smilei/smilei>



Public

online documentation
public issues

Private

development branches
development issues



two repositories

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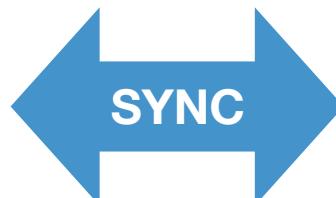


Public

online documentation
public issues

Private

development branches
development issues





get the sources



```
git clone https://github.com/SmileiPIC/Smilei.git
```



get the sources



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The screenshot shows a GitHub repository page. At the top left is the repository name "SmileiPIC / Smilei". To the right are four buttons: "Unwatch" (12), "Unstar" (26), "Fork" (14). Below these are navigation links: "Code" (selected), "Issues 1", "Pull requests 0", "Projects 0", "Wiki", "Insights", and "Settings".



get the sources



```
git clone https://github.com/SmileiPIC/Smilei.git
```

SmileiPIC / Smilei

Unwatch ▾ 12

Unstar 26

Fork 14

Code

Issues 1

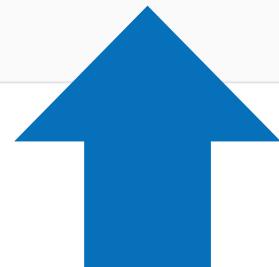
Pull requests 0

Projects 0

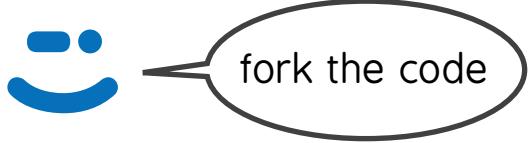
Wiki

Insights

Settings



```
git clone https://github.com/username/Smilei.git
```



get the sources



```
git clone https://github.com/SmileiPIC/Smilei.git
```

SmileiPIC / Smilei

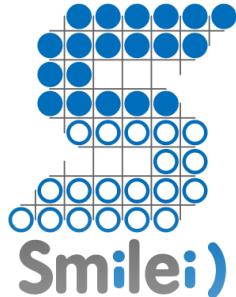
Code Issues 1 Pull requests 0 Projects 0 Wiki Insights Settings

Unwatch 12 Unstar 26 Fork 14

```
git clone https://github.com/username/Smilei.git
```



get the documentation



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[Highlights](#)

[Releases](#)

[Units](#)

[PIC algorithms](#)

Smilei is a collaborative Particle-In-Cell code for plasma simulation. Open-source, user-friendly and designed for high performances on super-computers, it is applied to a wide range of physics studies: from relativistic laser-plasma interaction to astrophysics.



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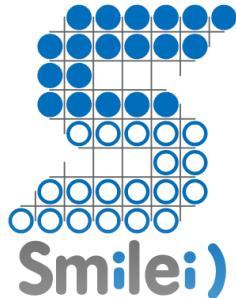
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Overview

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- [Highlights](#)
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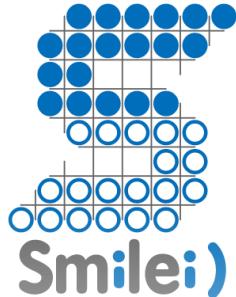
online:

smileipic.github.io/Smilei

www.maisondelasimulation.fr/smilei



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smileipic.github.io/Smilei

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on your machine:

`make doc`



restructured text

Write a namelist

Before you run :program:`Smilei`, you need a *namelist* (an input file). The namelist is written in the *python* language. It is thus recommended to know the basics of *python*.

We suggest you copy one existing namelist from the folder *benchmarks*. All namelists have the extension ``.py``.

General rules

^^^^^^^^^^^^^

* :program:`Smilei` requires a few *blocks* to be defined, such as::

```
Main(  
    # ...  
    timestep = 0.01,          # defines the timestep value  
    grid_length = [10., 20.], # defines the 2D box dimensions  
    # ...  
)
```

Outside blocks, you can calculate anything you require.

Inside a block, you must only define variables for :program:`Smilei`.



restructured text

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improve
docs

restructured text

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compile

few dependencies: hdf5, python, numpy

Makefile
THE ORIGINAL BUILD TOOL



compile

few dependencies: hdf5, python, numpy

for non-standard machines:

scripts/CompileTools/machine/**poincare**

Makefile
THE ORIGINAL BUILD TOOL



few dependencies: hdf5, python, numpy

Makefile
THE ORIGINAL BUILD TOOL

for non-standard machines:

scripts/CompileTools/machine/**poincare**

```
# module load intel/15.0.0 intelmpi/5.0.1 hdf5/1.8.16_intel_intelmpi_mt ...
# unset LD_PRELOAD
# export PYTHONHOME=/gpfslocal/pub/python/anaconda/Anaconda-2.1.0

LDFLAGS += -lgpfs -lz -L/gpfslocal/pub/python/anaconda/Anaconda-2.1.0/lib
CXXFLAGS += -xAVX
```



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THE ORIGINAL BUILD TOOL

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```

```
make machine=poincare
make machine=poincare help
```



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few dependencies: hdf5, python, numpy

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Makefile
THE ORIGINAL BUILD TOOL



where to start

95 test cases



where to start

95 test cases

obviously located in the **benchmarks** directory

Geometry

Physical meaning

`tst2d_2_radiation_pressure_acc.py`

progressive
number



add a
test case

where to start

95 test cases

obviously located in the **benchmarks** directory

Geometry

Physical meaning

`tst2d_2_radiation_pressure_acc.py`

progressive
number



troubles?



SmileiPIC / Smilei

Unwatch 12 Unstar 26 Fork 14

Code Issues 1 Pull requests 0 Projects 0 Wiki Insights Settings

Filters ▾ Search all issues Labels Milestones New issue



troubles?



SmileiPIC / Smilei

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integration workflow

1. modify your local fork on  GitHub



integration workflow

1. modify your local fork on  GitHub
2. create a pull request

Screenshot of a GitHub repository page for "SmileiPIC / Smilei".

The page shows:

- Code, Issues (1), Pull requests (0) (highlighted in orange)
- Projects (0), Wiki, Insights, Settings
- Unwatch (12), Unstar (26), Fork (14)

Below the main navigation:

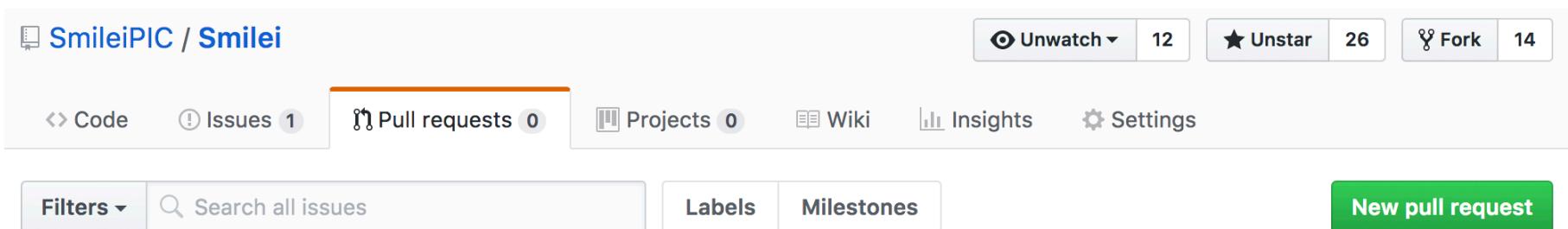
- Filters ▾, Search all issues, Labels, Milestones
- New pull request button





integration workflow

1. modify your local fork on  GitHub
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SmileiPIC / Smilei

Unwatch 12 Unstar 26 Fork 14

Code Issues 1 Pull requests 0 Projects 0 Wiki Insights Settings

Filters Search all issues Labels Milestones New pull request

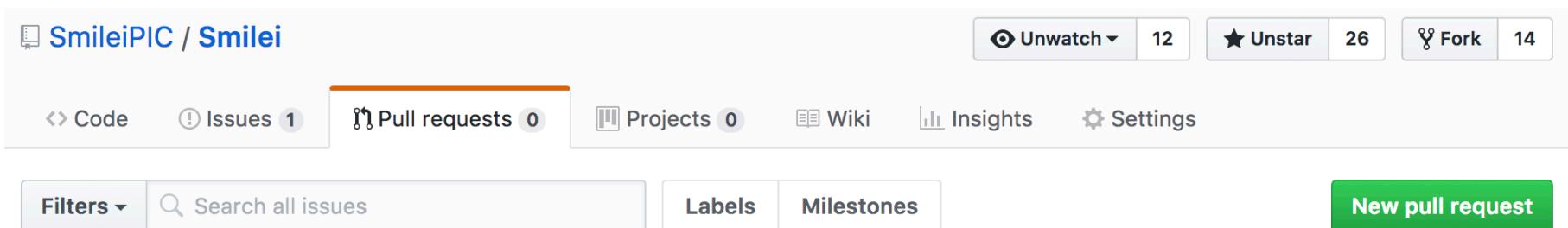
3. we test on  GitLab





integration workflow

1. modify your local fork on  GitHub
2. create a pull request



3. we test on  GitLab



4. feature / fix is integrated on  GitHub



integration workflow

1. modify your local fork on GitHub
2. create a pull request

The screenshot shows a GitHub repository page for 'SmileiPIC / Smilei'. At the top, there are buttons for 'Unwatch' (12), 'Unstar' (26), and 'Fork' (14). Below that, there are tabs for 'Code', 'Issues 1', 'Pull requests 0' (which is highlighted with an orange border), 'Projects 0', 'Wiki', 'Insights', and 'Settings'. Further down, there are 'Filters', a search bar 'Search all issues', 'Labels', 'Milestones', and a green button labeled 'New pull request'. A large blue arrow points upwards from the 'Pull requests' tab towards the 'New pull request' button.

3. we test on GitLab



4. feature / fix is integrated on GitHub



continuous integration

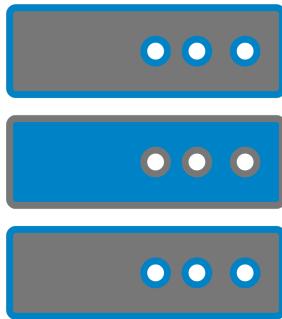


continuous integration



GitLab

MR

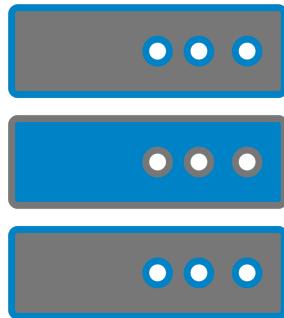




continuous integration



GitLab
MR



Test with 4 MPI and 4 OpenMP:

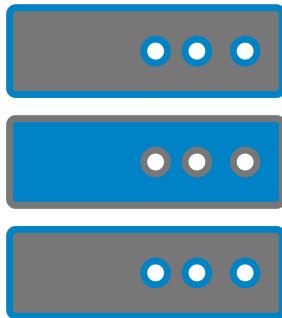
- compilation
- physical tests
- code consistency



continuous integration



GitLab
CI



Test with 4 MPI and 4 OpenMP:

- compilation
- physical tests
- code consistency

passed Pipeline #1495

Fix bug compilation in debug mode

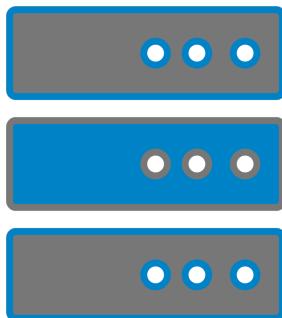
5 jobs from [develop](#) in 23 minutes 9 seconds (queued for 2 seconds)



continuous integration



GitLab
CI



Test with 4 MPI and 4 OpenMP:

- compilation
- physical tests
- code consistency

✔ passed Pipeline #1495

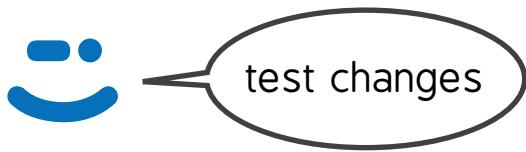
Fix bug compilation in debug mode

⌚ 5 jobs from [develop](#) in 23 minutes 9 seconds (queued for 2 seconds)

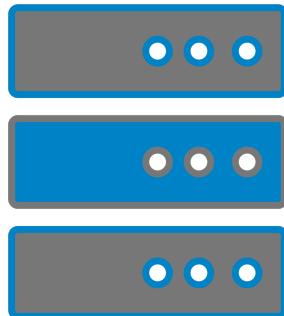
✖ failed Pipeline #1491

correction of 3D4Order interpolator

⌚ 6 jobs from [develop](#) in 16 minutes 32 seconds (queued for 3 seconds)



continuous integration



Test with 4 MPI and 4 OpenMP:

- compilation
- physical tests
- code consistency

passed Pipeline #1495

Fix bug compilation in debug mode

⌚ 5 jobs from [develop](#) in 23 minutes 9 seconds (queued for 2 seconds)

failed Pipeline #1491

correction of 3D4Order interpolator

⌚ 6 jobs from [develop](#) in 16 minutes 32 seconds (queued for 3 seconds)



validation/validation.py



validation/validation.py

1. benchmark file

benchmarks/tst1d_0_em_propagation.py



validation/validation.py

1. benchmark file

benchmarks/tst1d_0_em_propagation.py

2. python script

validation/validate_tst1d_0_em_propagation.py



validation/validation.py

1. benchmark file

benchmarks/tst1d_0_em_propagation.py

2. python script

validation/validate_tst1d_0_em_propagation.py

```
1 import os, re, numpy as np, h5py
2 from Smilei import *
3
4 S = Smilei(".", verbose=False)
5
6 # FIELD DIAG
7 Validate("List of fields in Field0", S.Field.Field0().getFields() )
[...]
29 max_ubal = np.max( np.abs(S.Scalar.Ubal().getData()) )
30 Validate("Max Ubal is below 2%", max_ubal<0.02 )
```

validation/validation.py

1. benchmark file

benchmarks/tst1d_0_em_propagation.py

2. python script

validation/validate_tst1d_0_em_propagation.py

```
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[...]
29 max_ubal = np.max( np.abs(S.Scalar.Ubal().getData()) )
30 Validate("Max Ubal is below 2%", max_ubal<0.02 )
```

3. reference file

validation/references/tst1d_0_em_propagation.py.txt



not only HPC

3rd year of practicals @UPMC <https://github.com/SmileiPIC/TPUPMC>



not only HPC

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The screenshot shows a desktop environment with several windows open:

- Terminal:** Shows the command `smileiQt` running.
- Code Editor:** Displays the Python script `TP_proj1.py` (~/TPUPMC). The code defines a simulation setup with a 1D geometry, regular initial positions, and cold initial momentum. It specifies a simulation time of $10^2 \pi$, a timestep of 0.18, and a cell length of 0.1. The script also sets up boundary conditions and initializes two species: ions and electrons with specific parameters like mass, charge, and initial density distributions.
- Visualization Tool:** Shows the `TP_proj2` application window. The top plot shows the total density (`Utot`) over time, with a sharp peak around time 23.1. The middle plot shows the electron density (`Ukin_eon1`) versus position, showing a dip around position 1.2. The bottom plot is a 2D heatmap of the particle distribution function (`pxp`) versus position and momentum, with a color scale from 0 to 135.



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The screenshot shows a desktop environment with several windows open:

- Code Editor:** A window titled "TP_proj1.py (~/TPUPMC)" containing Python code for a simulation setup. The code defines a main configuration and two species: "ion" and "eon". It includes parameters like geometry ("1d3v"), interpolation order (2), simulation time (10*2*pi), timestep (0.18), and cell length ([0,1]). The "ion" species has mass 1836.0 and charge 1.0. The "eon" species has mass 1.0 and charge -1.0, with a cosine density profile.
- Plotting Tool:** A window titled "TP_proj2" showing simulation results at Time: 23.1. It displays three plots:
 - A 1D line plot of "Tot" vs position, showing a sharp peak around x=25 and a noisy oscillation around x=40.
 - A 1D line plot of "Rho_eon1" vs position, showing a smooth curve that decreases from ~-0.5 to ~-1.1 between x=0.8 and x=1.2.
 - A 2D heatmap of "pxp" vs position (x) and velocity (p). The color scale ranges from 0 to 135. The distribution is centered around p=0 for most of the range, with a significant peak near p=100 at x=0.5.
- File Explorer:** A small window showing icons for "Trash" and "Home".
- Terminal:** A window showing the command "TP_proj1.py (~/TPUPMC)" and the output "TP_proj2".



summary



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- get Smilei on new machines / architectures
- provide / expand docs
- report problems
- provide benchmarks / new physical test cases
- let the students play
- code a new feature / fix an issue



be happy
keep Smilei)

summary

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